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TITLE: WAFER DICING DEVICE

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INT-CL (IPC): H01L 21/68; B23Q 3/08; B26F 3/00; H01L 21/301

ABSTRACT:

PROBLEM TO BE SOLVED: To obtain a wafer dicing device which is capable of dicing a wafer without producing cutdusts which cause contamination to the surface of a semiconductor wafer, enhancing products formed of the wafer in yield, and reducing the cost for replacing dicing expendable parts.

SOLUTION: A high-pressure liquid jet head 20 is moved relative to a wafer 14 held by a wafer holding device 11, and the wafer 14 is diced by a jet stream 20a of high-pressure liquid shot from the high-pressure liquid jet head 20. The wafer holding device 11 is composed of holding means 13 which are provided to hold the pellet regions 14a of the wafer 14 that are turned into pellets.

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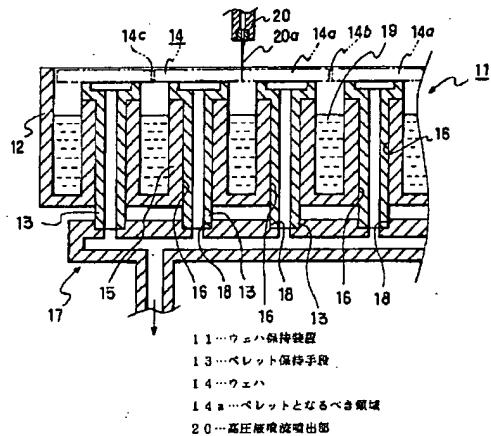
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(54)【発明の名称】 ウェハのダイシング装置

(57)【要約】

【課題】 半導体ウェハ14表面を汚染する切粉の発生を伴わないダイシングを可能にしてウェハ14から得られる製品14aの歩留まりの向上を図り、ダイシング用の消耗部品の交換に要するコストを低減する。

【解決手段】 高圧液噴流噴出ヘッド部20のウェハ保持装置11に保持されたウェハ14に対する相対位置を移動させながら該高圧液噴流噴出ヘッド部20から噴出される高圧液噴流20aによってウェハ14を切断することによりダイシングするようになる。そして、ウェハ保持装置11は、ウェハのダイシングによりペレットとなる各ペレット領域14a毎に設けられ該領域を保持する複数の保持手段13からなる。



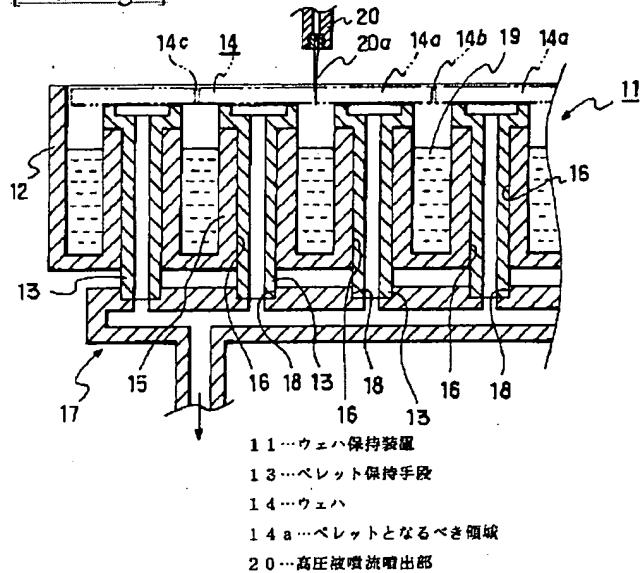
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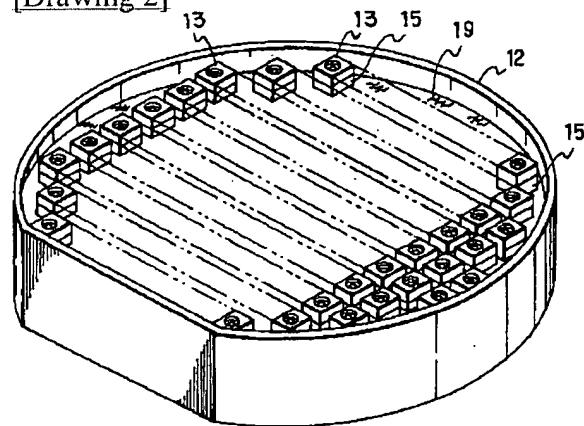
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## DRAWINGS

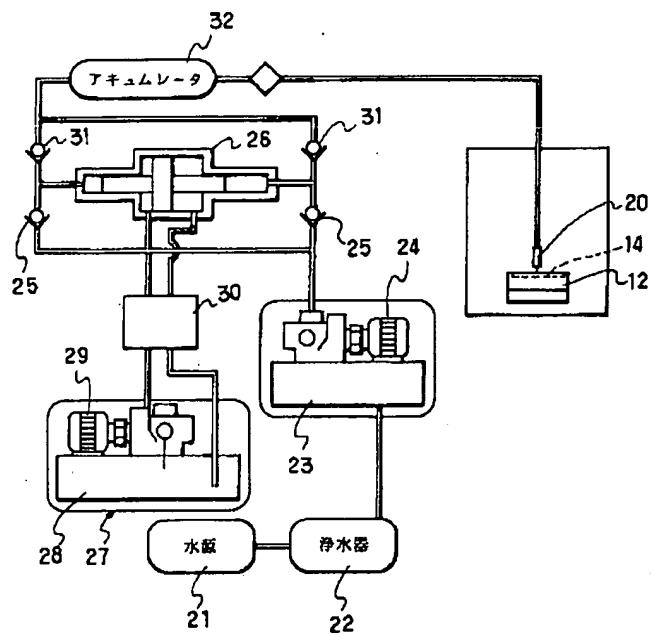
## [Drawing 1]



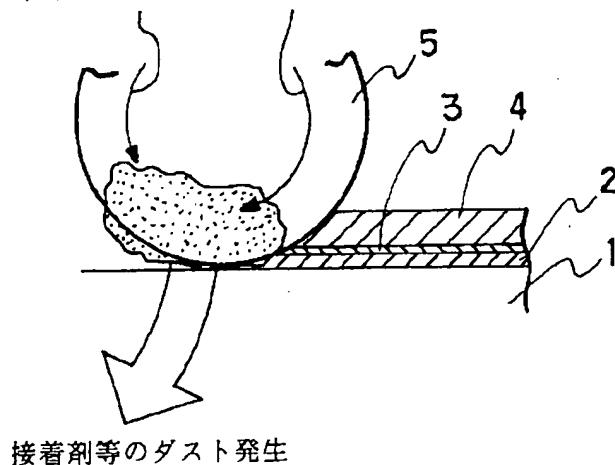
## [Drawing 2]



## [Drawing 3]



[Drawing 4]  
アップカット ダウンカット



接着剤等のダスト発生

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Field of the Invention] This invention relates to the dicing equipment of a wafer, and the dicing equipment which mainly carries out the dicing of the semi-conductor wafer.

#### [0002]

[Description of the Prior Art] In manufacture of a semiconductor device, it is required to carry out dicing, to make a semi-conductor wafer into each semi-conductor pellet, after various processings, processing, etc. finish to a semi-conductor wafer, namely, to pelletize. And the dicing was performed by cutting the street of the semi-conductor wafer 4, carrying out high-speed rotation of the dicing blade (cutting cutting edge) 5, as the former is shown in drawing 4.

[0003] In a drawing, the adhesives with which 1 was applied extensively [ a base and 2 / a mounting sheet and 3 ] on this mounting sheet 2, the semi-conductor wafer which pasted up 4 through these adhesives 3 on this mounting sheet 2, and 5 are dicing blades (cutting cutting edge), are attached at the tip of the spindle which is not illustrated and carry out high-speed rotation. And dicing is cut and carried out, moving relatively the dicing blade 5 which carries out high-speed rotation to the semi-conductor wafer 4 on a base 1.

#### [0004]

[Problem(s) to be Solved by the Invention] By the way, since the adhesives 3 spreading section was cut into dicing with the conventional dicing blade 5 by the dicing blade 5, the dust by adhesives 3 occurred in it, and there was a problem said that it is not rare for silicon dust to adhere to the semi-conductor pellet 4 firmly with the adhesives 3 further in it. Especially, in the case of an upcutting method, there is an inclination many yield falls of the pellet 4 by silicon dust to be.

[0005] Moreover, the dicing blade 5 also had the problem that exchange frequency was high and it had become one of the factors of the increase of cost of a semiconductor device since it is not rare for a load to become large and to cause blade breakage, either, when adhesives adhere at the time of the rotation cutting, and wear is intense and the life is short, though breakage is not caused. Of course, although problems, such as such wear, are mitigable by performing cooling using the cooling water of the cutting section suitably, supply of cooling water also causes an increase of cost.

[0006] It succeeds in this invention that such a trouble should be solved, improvement in the yield of the product which makes possible dicing without generating of the chip which pollutes a wafer front face, and is obtained from a wafer is aimed at, and it aims at reducing the cost which exchange of the consumables for dicing takes.

#### [0007]

[Means for Solving the Problem] It is made to carry out the dicing of the dicing equipment of claim 1 by cutting a wafer by the high-pressure liquid jet which blows off from this high-pressure liquid jet jet section, moving the relative position to the wafer held at the wafer supporting structure of the high-pressure liquid jet jet section. Therefore, according to the dicing equipment of the wafer of claim 1, since a high-pressure liquid jet cuts a wafer, a dicing blade (cutting cutting edge) is not needed, but the

big cost increase factor which existed conventionally [ of having exchanged a dicing blade ] is lost. [0008] And when the dicing of the wafer can be carried out by very thin width of face according to the high-pressure liquid jet, since dust can be made very detailed, a possibility of dust polluting a wafer and making a fatal defect produce can decrease, and the yield can be raised. Moreover, since it cuts by the high-pressure liquid jet, when using a dicing blade, required cooling water is it less necessary to be supplied, and it can aim at reduction of the cost which dicing takes.

[0009] The dicing equipment of the wafer of claim 2 is characterized by consisting of two or more maintenance means by which the wafer supporting structure is prepared for each [ become a pellet by the dicing of a wafer ] pellet field of every, and holds this field in the dicing equipment of a wafer according to claim 1. Therefore, since according to the dicing equipment of the wafer of claim 2 the field used as each pellet is held independently by the maintenance means, respectively even if the dicing of a wafer advances, where each pellet is held by the maintenance means, dicing can be finished, and there is no possibility that the location of a pellet may become unstable.

[0010]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail according to the gestalt of illustration implementation. Drawing 1 thru/or drawing 3 show the gestalt of operation of the 1st of this invention, and drawing 1 is [ a perspective view and drawing 3 of a sectional view and drawing 2 ] the block diagrams of high-pressure liquid jet developmental mechanics. In a drawing, 11 is the wafer supporting structure and consists of a tank 12, and the pellet maintenance means 13 and 13 of a large number which hold the field used as each pellet of a semi-conductor wafer by vacuum adsorption and to hold and ..

[0011] the magnitude to which the tank 12 of a flat-surface configuration is of the same shape as the semi-conductor wafer 14, and it is restored -- having -- a base -- a projection -- a large number (the number and the same number of the above-mentioned pellet maintenance means 13) 15 and 15, and ... it is formed. This each projection 15 has at the core the insertion hole 16 along which the above-mentioned pellet maintenance means 13 passes, respectively, and the height of projection 15 is suitably made lower than the depth of a tank 12. It is for holding each fields 14a and 14a which each above-mentioned pellet maintenance means 13 and 13 and ... are separated by the dicing of the semi-conductor wafer 14, and serve as a pellet, and ... by vacuum adsorption. It is inserted in the above-mentioned projections 15 and 15, the above-mentioned insertion holes 16 and 16 of ..., and ... Fitting immobilization is carried out at each holes 18 and 18 of the vacuum suction base 17 under a tank 12, and ..., and lower limits draw in all at once by each pellet maintenance means 13 and 13 and ... through the vacuum suction base 17, or it enables it to stop suction all at once.

[0012] 19 is water into which it was put by the tank 12, and the oil level is made into the height which does not exceed projections 15 and 15 and ... This water 19 plays a role of a buffer means of the pressure of a high-pressure stream. 20 is the water head (high-pressure liquid jet jet section) which spouts a high-pressure stream, and generates high-pressure stream 20a which is sufficient for cutting the semi-conductor wafer 14. The dicing of this water head 20 is carried out by moving relatively to the wafer supporting structure 11, and carrying out full cutting of the semi-conductor wafer 14 according to a high-pressure stream. In drawing 1 , 14b shows the part which should be carried out full cutting, and 14c shows the part by which full cutting was carried out.

[0013] Next, high-pressure stream developmental mechanics is explained according to drawing 4 . In this drawing, the water purifier with which 21 purifies a source and 22 purifies the water from this source 21, the pump which supplies the water by which 23 was purified with this water purifier 22 to a booster side, the motor whose 24 is the source of power of the pump 23, and 25 and 25 are the check valves prepared in the channel from a pump 23 to a booster 26. As for an oil and 29, the oil pressure mechanical component to which the above-mentioned booster 26 becomes from oil hydraulic cylinder equipment, and 27 drives the oil hydraulic cylinder equipment, and 28 are [ a motor and 30 ] control bulbs.

[0014] 31 and 31 are the check valves prepared in the channel where the water which the booster 26 which consists of the above-mentioned oil hydraulic cylinder equipment boosted faces to an

accumulator 32. An accumulator 32 stabilizes the pressure of the stream which changes with above-mentioned oil hydraulic cylinder equipment like a pulsating flow. The high-pressure stream stabilized with this accumulator 32 is used for dicing. In addition, it is good for the water to spout to mix an abrasive material.

[0015] According to the dicing equipment of such a wafer, since a high-pressure stream cuts the semiconductor wafer 14, a dicing blade (cutting cutting edge) is not needed, but the big cost increase factor which existed conventionally [ of having exchanged a dicing blade ] is lost. Moreover, the conventional trouble of adhesives serving as dust or making a wafer fix silicon dust is also lost. Therefore, reduction of a percent defective and improvement in a yield can be aimed at. And when the dicing of the semiconductor wafer 14 can be carried out by very thin width of face according to the high-pressure stream, since dust, such as silicon, becomes very detailed, a possibility of dust polluting a wafer and making a fatal defect produce can decrease, and the yield can be raised.

[0016] Moreover, since it cuts with a high-pressure stream, when using a dicing blade, required cooling water is it less necessary to be supplied, and it can aim at reduction of the cost which dicing takes. and each pellet fields 14a and 14a which serve as a pellet by the dicing in the semi-conductor wafer 14 and ..., since it holds by two or more maintenance means 13 and 13 and ... which are prepared in \*\* and hold this field Since it is held independently by the maintenance means 13 and 13 and ..., respectively even if the fields 14a and 14a which the dicing of a wafer advances and serve as each pellet, and ... become independent of others After each pellet has been held by the maintenance means 13 and 13 and ..., dicing can be finished, and there is no possibility that the location of a pellet may become unstable.

[Example]

[0017] In the gestalt of operation shown in drawing 1 and drawing 2 , although the water 19 in a tank 12 was used as a buffer of a high-pressure stream Although it is not necessarily indispensable to use water and a high-pressure stream has a very strong cutting force to the body which receives it perpendicularly since the cutting force is very weak, from a wafer 14, boil especially the buffer of the high-pressure stream which goes downward, and it is not prepared, but you may make it receive the high-pressure stream aslant to the body which wins popularity aslant The part of the base of a tub 12 shown in drawing 1 in that case which receives a high-pressure stream at least is made slanting. Then, it is not necessary to put in water in a tub 12.

[0018]

[Effect of the Invention] According to the dicing equipment of the wafer of claim 1, since a high-pressure liquid jet cuts a wafer, a dicing blade (cutting cutting edge) is not needed, but the big cost increase factor which existed conventionally [ of having exchanged a dicing blade ] is lost.

[0019] And when the dicing of the wafer can be carried out by very thin width of face according to the high-pressure liquid jet, since dust can be made very detailed, a possibility of dust polluting a wafer and making a fatal defect produce can decrease, and the yield can be raised. Moreover, since it cuts by the high-pressure liquid jet, when using a dicing blade, required cooling water is it less necessary to be supplied, and it can aim at reduction of the cost which dicing takes.

[0020] Since according to the dicing equipment of the wafer of claim 2 the field used as each pellet is held independently by the maintenance means, respectively even if the dicing of a wafer advances, where each pellet is held by the maintenance means, dicing can be finished, and there is no possibility that the location of a pellet may become unstable. And since adhesives become a pollution source, or a wafer front face is made to fix dust, since a wafer is held with a maintenance means, without using adhesives, and squirrel \*\*\*\*\* is lost, it becomes the factor whose yield improves.

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The dicing equipment [claim 2] of the wafer which makes it the description as it comes to carry out dicing by cutting the above-mentioned wafer by the high-pressure liquid jet which blows off from this high-pressure liquid jet jet section while moving the relative position to the wafer which was equipped with the high-pressure liquid jet jet section which spouts a high-pressure liquid jet, and the wafer supporting structure holding a wafer at least, and was held at the above-mentioned wafer supporting structure of the above-mentioned high-pressure liquid jet jet section The wafer supporting structure is dicing equipment of the wafer according to claim 1 characterized by consisting of two or more maintenance means for it to be prepared for each [ become a pellet by the dicing of a wafer ] pellet field of every, and to hold this field.

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[Translation done.]